
Arrayed cellular microenvironments for identifying culture and differentiation conditions for stem, primary and rare cell populations.

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Authors: David A Brafman, Shu Chien, Karl Willert

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Public Summary:

This manuscript provides a highly detailed description of how to apply the technology called arrayed cellular microenvironments to human pluripotent stem cells. The paper is a valuable resource to scientists who wish to employ this powerful technology in their own research.

Scientific Abstract:

During the development of an organism, cells are exposed to a myriad of signals, structural components and scaffolds, which collectively make up the cellular microenvironment. The majority of current developmental biology studies examine the effect of individual or small subsets of molecules and parameters on cellular behavior, and they consequently fail to explore the complexity of factors to which cells are exposed. Here we describe a technology, referred to as arrayed cellular microenvironments (ACMEs), that allows for a high-throughput examination of the effects of multiple extracellular components in a combinatorial manner on any cell type of interest. We will specifically focus on the application of this technology to human pluripotent stem cells (hPSCs), a population of cells with tremendous therapeutic potential, and one for which growth and differentiation conditions are poorly characterized and far from defined and optimized. A standard ACME screen uses the technologies previously applied to the manufacture and analysis of DNA microarrays, requires standard cell-culture facilities and can be performed from beginning to end within 5-10 days.

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